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UTILITY
PATENT APPLICATION
TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. MUL1612-002

First Inventor Flanagan et al.

Title SYSTEM AND METHOD FOR CLOSED CAPTION DATA
TRANSLATION

Express Mail Label No. EL622262384US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

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Washington, DC 20231

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages 18]
(preferred arrangement set forth below)
- Descriptive title of the invention
 - Cross Reference to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 5]
5. Oath or Declaration [Total Pages 3]
- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 CFR 1.63 (d))
(for continuation/divisional with Box 17 completed)
- ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s)
named in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

7. ☐ CD-ROM or CD-R in duplicate, large table or
Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Form (CRF)
- b. Specification Sequence Listing on:
- i. ☐ CD-ROM or CD-R (2 copies); or
 - ii. ☐ paper
- c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☒ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement ☐ Power of
(when there is an assignee) Attorney
11. ☐ English Translation Document (if applicable)
12. ☒ Information Disclosure ☒ Copies of IDS
Statement (IDS)/PTO-1449 Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
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(if foreign priority is claimed)
16. ☐ Other:

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment,
or in an Application Data Sheet under 37 CFR 1.76:☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No. _____

Prior application information:

Examiner _____

Group/ Art Unit: _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under
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CAROL G. STOVSKY

Registration No. (Attorney/Agent)

42,171

Signature

Carol G. Stovsky

Date

October 24, 2000

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FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT

(\$ 423.00)

Complete if Known

Application Number

Filing Date

October 24, 2000

First Named Inventor

Flanagan et al.

Examiner Name

Group Art Unit

Attorney Docket No.

MUL1612-002

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit
Account
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☐ Charge Any Additional Fee Required
Under 37 CFR 1.16 and 1.17

☐ Applicant claims small entity status
See 37 CFR 1.27

2. ☒ Payment Enclosed:

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Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
101	710	201	355	Utility filing fee	365.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	345	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) (\$ 365.00)

2. EXTRA CLAIM FEES

	Extra Claims	Fee from below	Fee Paid
Total Claims	22	-20 ** = 2	x 9.00 = 18.00
Independent Claims	3	-3 ** = 0	x = 0.00
Multiple Dependent			= 18.00

** or number previously paid, if greater, For Reissues, see below

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
103	18	203	9	Claims in excess of 20	
102	78	202	39	Independent claims in excess of 3	
104	260	204	130	Multiple dependent claims, if not paid	
109	78	209	39	** Reissue independent claims over original patent	
110	18	210	9	** Reissue claims in excess of 20 and over original patent	

SUBTOTAL (2) (\$ 18.00)

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2520	147	2520	For filing a request for ex parte reexamination	
112	920	112	920	Requesting publication of SIR prior to Examiner Action	
113	1840	113	1840	Requesting publication of SIR after Examiner Action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1360	218	680	Extension for reply within fourth month	
128	1850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1510	138	1510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1210	241	605	Petition to revive - unintentional	
142	1210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40.00
146	690	246	345	Filing a submission after final rejection (37 CFR Section 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR Section 1.129(b))	
179	710	279	355	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify):

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 40.00)

SUBMITTED BY

Complete (if applicable)

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Signature	Carol G. Stovsky	Date	October 24, 2000		

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STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(c))-- SMALL BUSINESS CONCERN

Docket Number (Optional)
MUL1612-002

Applicant, Patentee, or Identifier: Mary A. Flanagan, Philip Jensen, and Douglas P. Chinnock

Application or Patent No.: _____

Filed or Issued: October 24, 2000

Title: SYSTEM AND METHOD FOR CLOSED CAPTION DATA TRANSLATION

I hereby state that I am

- ☒ the owner of the small business concern identified below:
☐ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN MultiLingual Media, Inc.

ADDRESS OF SMALL BUSINESS CONCERN 61 Nicholas Road, Suite B#, Framingham, Massachusetts
01701

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☐ the application identified above.
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NAME OF PERSON SIGNING Mary Flanagan

TITLE OF PERSON IF OTHER THAN OWNER President

ADDRESS OF PERSON SIGNING 61 Nicholas Road, Suite B3, Framingham, MA 01701

SIGNATURE Mary A. Flanagan DATE 10-10-00

JC929 U.S. PTO
09/695631



APPLICATION FOR UNITED STATES LETTERS PATENT
FOR
SYSTEM AND METHOD FOR CLOSED CAPTION DATA TRANSLATION

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SYSTEM AND METHOD FOR CLOSED CAPTION DATA TRANSLATION

Inventors: Mary A. Flanagan
Philip Jensen
Douglas P. Chinnock

Technical Field

The present invention relates to transmission of closed caption data with
5 broadcast signals. In particular, the present invention relates to translation of closed
caption data from a source language to a target language.

Background of the Invention

Despite the widespread access to television technology worldwide, language
10 remains a barrier to broad dissemination of program content. More television content is
developed in English than in any other language, yet English is spoken by only a tiny
fraction of the world's population. Likewise, programming developed in other languages
is inaccessible to speakers of English. A small amount of this content is translated by
traditional means at high cost and with delays of weeks or even months. However, for
15 television content that is perishable in nature, such as news, sports, or financial
programs, there is no solution to broad distribution across languages. Such
programming rapidly decreases in relevance over time, making the translation delays of
weeks or more unacceptable. As a result, virtually all live television content goes
untranslated, with different live programming developed specifically for each language
20 market.

Live and time-sensitive television content is increasingly being delivered over the
Internet in the form of streaming video. Broadband Internet access, a de facto

requirement for consumer access to streaming video, is being rapidly adopted by U.S. households. Market research suggests that by 2003, close to 9 million U.S. households will subscribe to a cable modem, up from 1.3 million at 1999 year-end. In Western Europe, exponential growth is predicted in the use of cable modems over the 1998-2003 time frame, and surveys are already showing that high speed access (ISDN or greater) is the predominant mode of Internet access. Regardless of the whether the delivery medium is a television set or an Internet-ready computer, language remains the critical barrier to widespread use of this broadcast content.

Summary of the Invention

The present invention is a system and method for translating closed caption data. Closed caption data received from a television broadcast are translated, virtually in real-time, so that a viewer can read the closed caption data in his or her preferred language as the television program is broadcast. The present invention instantly localizes television program content by translating the closed caption data. The process of the present invention is fully automated, and may be used in conjunction with any machine translation system that has adequate performance to process translation in real-time to keep up with the program flow of caption data. A server supports real-time translation of eight television channels simultaneously, and translations are produced with less than a one-second delay. The server can produce either closed caption or subtitled output. An optional Separate Audio Program (SAP) may be added to the output that contains a computer generated speech rendering of one translation.

In accordance with the present invention, closed caption data is pre-edited to correct errors, recognize relevant text breaks, and enhance input quality to the machine translation system. For example, misspellings in the caption data are corrected before machine translation so that the machine translation system provides a correct translation from the source language to the target language. Incomplete sentences are detected and flagged or expanded so that the machine translation system provides a more accurate translation. The pre-editing process, which is unique to the present invention, results in high quality translations from commercially available machine translation systems. A unique text-flow management process further facilitates the processing and translating of text through the various components of the present invention.

Brief Description of the Drawings

Fig. 1 is a schematic diagram of the primary components for translation of streamed captions in accordance with an example embodiment of the present invention;

Fig. 2 is a schematic diagram of the primary components for translation of closed caption data with a combination decoder/subtitler device in accordance with an example embodiment of the present invention;

Fig. 3 is schematic diagram of the primary components for translation of time positioned captions in accordance with an example embodiment of the present invention;

Fig. 4 is a flowchart of the primary steps for closed caption text flow management in accordance with an example embodiment of the present invention; and

Fig. 5 is a flowchart of the primary steps for pre-editing of closed caption data in accordance with an example embodiment of the present invention.

Detailed Description of the Drawings

5 Referring to Fig. 1, a schematic diagram of the primary components for translation of streamed captions in accordance with an example embodiment of the present invention is shown. The program source 100 signal originates from a videotape recorder (VTR) or feed from a live cable or satellite signal. The program source 100 video, which may be in either National Television Systems Committee (NTSC) signal 104 format or National Association of Broadcasters (NAB) format consisting of video and closed caption (CC) data in the vertical blanking interval (VBI), is provided to both the CC decoder 106 and to the CC encoder 116 and another device 122. The other device 122 may be a subtitle that produces subtitles from translated text 114 received from the MT computer 110. Alternatively (or in addition), the other device 122 may be a text-to-speech (TTS) device (e.g., Lucent Technologies' "Lucent Speech Solutions" product) that synthesizes speech from the translated text 114. The synthesized speech from the TTS device 122 is placed into the Separate Audio Program (SAP) portion of the audio signal 102. Although Fig. 1 shows transmission of the NTSC signal 104 to the CC encoder 116 and the other device 122 (e.g., subtitle or TTS device), in alternative 20 embodiments of the present invention, the NTSC signal 104 may be transmitted to either the CC encoder 116 or the other device 122 and the MT computer may be adapted to send translated CC data 112 to a CC encoder 116 or translated text 114 to another device 122. Any type of signal that comprises closed caption data may be

directed to the MT computer 110 for translation. In addition to the NTSC signal, the present invention may also be used with the European NAB format program signal.

The CC decoder 106 extracts the CC codes (which consist of text, position, and font information) from the NTSC signal 104 and provides them to the MT computer 110 as a serial stream. In an example embodiment of the present invention, source language CC codes 108 may be transmitted from the CC decoder 106 to the MT computer 110.

The machine translation or MT computer 110 is a server that may be a Windows NT/2000 PC equipped with two serial ports. The MT computer 110 comprises machine translation (MT) software that performs automatic translation of human languages such as Transparent Language's Transcend SDK, Version 2.0. The MT software translates text from a first or source language to text in a second or target language. The MT software on the MT computer 110 translates the source language text stream or CC codes 108 from the CC decoder 106 to a target language. The target language may be any language (e.g., French, German, Japanese, or English) supported by the MT software on the MT computer 110. Then, the MT computer 110 merges the translated text stream with position and font information from the original CC codes. Resulting translated CC data 112 are transmitted to the CC encoder 116 as a serial stream. Resulting translated text 114 is transmitted to the other device 122 (e.g., subtitle or TTS device), also as a serial stream.

The CC encoder 116 combines the NTSC signal 104 or video portion of the program from the program source 100 and the translated CC data 112 from the MT computer 110 to produce a new, translated NTSC video signal 118. The translated

NTSC signal 118 is transmitted to the program destination 120. The final NTSC video signal 118, along with the audio signal 102 of the program source 100, is provided to the program destination 120, which may be a VTR or feed for a television or Internet broadcast.

5 Similarly, if the other device 122 is a subtitler, it combines the NTSC signal 104 or video portion of the program from the program source 100 and the translated text 114 from the MT computer 110 to produce a new, translated NTSC video signal 124. The translated NTSC signal 124 is transmitted to the program destination 126. The final NTSC video signal 124, along with the audio signal 102 of the program source 100, is provided to the program destination 126, which may be a VTR or feed for a television or Internet broadcast. In addition, or alternatively, if the other device 122 is a TTS device, it combines the audio signal 102 from the program source 100 to produce a SAP channel for the audio provided to the program destination 126.

10 Referring to Fig. 2, an example embodiment of the present invention is shown in which closed caption data is translated for a program destination in accordance with a combination decoder/subtitler device (e.g., an Ultech SG401). Audio signals 202 and NTSC signals 204 originate from a program source 200. The NTSC signal 204 or video signal (which consists of video and CC data) is transmitted from the program source 200 to an Ultech SG401 device that comprises a CC decoder 206 and subtitler 208.

15 The CC decoder 206 extracts the source language CC codes 210 which consist of text, position, and font information and provides them to the MT computer 212 as a serial stream. The MT computer 212, which comprises MT software as explained above, translates the source language CC codes 210 from the CC decoder 206. The MT

20

computer 212 merges the translated data with position and font information and provides the resulting translated text 214 to the subtitle 208, also as a serial stream. The subtitle 208 combines the video portion of the program from the program source and the translated text 214 from the MT computer 212. The result is a new translated NTSC signal 216 with translated subtitles. The final NTSC signal 216, along with the audio signal 202 from the program source 200, is provided to program destination 218 which may be a VTR or feed for a television or Internet broadcast. In addition, the translated text 214 may be processed by a text-to-speech (TTS) module (e.g., Lucent Technologies' "Lucent Speech Solutions" product) that synthesizes speech which is placed into the Separate Audio Program (SAP) portion of the audio signal provided to program destination 218.

Referring to Fig. 3, a schematic diagram of the primary components for translation of time positioned captions in accordance with an example embodiment of the present invention is shown. The program source 300 NTSC signals 304 are processed in two tape passes. The NTSC signals 304 originate from a VTR program source 300. The NTSC signals 304 from the VTR program source 300 consist of video and caption data in the VBI. The NTSC signals 304 are transmitted from the program source 300 to the CC decoder 306. In addition, timing codes 310 are sent from the VTR program source 300 to a MT computer 312. The MT computer 312 may be adapted to send translated CC data 314 to a CC encoder 318 or translated text 316 to another device 324 such as a subtitle or TTS device.

The CC decoder 306 extracts the source language CC codes 308 which consist of text, position, and font information and provides them to the MT computer 312 as a

serial stream. The MT computer 312 records, to a first file, the timing codes 310 and CC codes 308 for the entire program. The MT computer 312 then processes the first file to produce a second file with timing, translated data, position, and font information.

Next, a second pass of the program source tape 300 is made. On the second pass, the timing codes 310 are used by the MT computer 312 to determine when to send translated CC data 314 to the CC encoder 318 or the translated text 316 to the other device (e.g., subtitle or TTS device). The CC encoder 318 combines the video portion or NTSC signals 304 from the program source 300 and the translated CC data 314 from the MT computer 312. The result is a new translated NTSC signal 320 that is transmitted from the CC encoder 318 to a program destination 322.

Alternatively, or in addition, the other device 324 (e.g., subtitle or TTS device) combines the video portion or NTSC signals 304 from the program source 300 and the translated text 316 from the MT computer 312. The result is a new translated NTSC signal 326 that is transmitted from the other device 324 to a program destination 328.

In accordance with the present invention, the server, shown as the MT computer in Figs. 1, 2, and 3, in addition to MT software, may further comprise text flow management software and pre-editing software. Referring to Fig. 4, the primary steps for closed caption text flow management in accordance with an example embodiment of the present invention are shown. In an example embodiment of the present invention, the text flow management software, which is unique to the present invention, executes on a computer that also performs the machine translation. In an alternative embodiment of the present invention, the text flow management software and machine translation may execute on different computers that are connected or on a network. In

the first step 400, the text flow management software receives signals from a program source such as a television broadcast or videotape recorder. In the next step 402, an incoming stream of plain text that is present in the program source as text occurring in fields CC1, CC2, CC3, or CC4 in line 21 of the VBI is decoded or extracted using a closed caption (CC) decoder that passes the CC text to the text flow management software. An example device is the Ultech SG401 that operates as a closed caption decoder or subtitle character generator.

In the next step 404, the CC text is pre-edited to correct errors in closed captions, recognize relevant text breaks, and enhance input quality. The pre-edited text is translated from a source language to a target language using machine translation software in step 406. An example of machine translation software that may be used with the present invention is Transparent Language's Transcend SDK MT program.

In step 408, the target language text produced by the MT software is inserted into the video signal. It may be inserted as subtitles using the Ultech SG401 character generator or as closed captions replacing the original CC field or any of the fields CC1, CC2, CC3, or CC4 using CC encoder equipment from many suppliers. Finally, in step 410, the target language text is sent as a standard NTSC signal to a program destination for broadcast or recording to videotape recorder. The output of the text flow management process is a television program with translated closed captions or subtitles, depending on user preference. The closed captions or subtitles are properly synchronized with the program, either through producing the translations in real-time, or in some cases, through buffering the audio and video during the translation process, and reuniting audio, video, and text once the translations are complete.

Referring to Fig. 5, the primary steps for pre-editing of closed caption data in accordance with an example embodiment of the present invention are shown. The pre-edit software, which is unique to the present invention, solves several problems associated with real-time closed caption translation.

5 One problem with real-time closed caption translation is producing adequate quality translations, and doing so quickly enough so that the captions or subtitles keep pace with the live running video. Producing high quality translation of this unique text type involves several related problems. Captions that are produced on the fly for live programming such as news tend to have numerous misspellings and phonetic renderings of correct spellings. The misspellings result from the on-the-spot nature of the captioning task. Captioners who create the source language closed caption data must keep up with the real-time flow of speech. They are trained to use techniques such as phonetic spelling to quickly render proper names and other terms whose spelling cannot be determined instantly. The phonetic spellings often differ from
10 common misspellings that occur when words are typed. Commercially available spell checking programs are not adequate for correcting these types of spellings. Because translation technology fails to recognize misspelled terms, the quality of the resulting translation is reduced. The present invention enhances the quality of the end result by pre-editing the closed caption data to recognize and correct this class of errors.
15

20 Another linguistic problem with real-time closed caption data is that a varying percentage of the text stream is complete sentences. This percentage often ranges from more than 85% in pre-written news broadcasts to as little as 20% in the unrehearsed speech of some speakers. The pre-editing techniques of the present

invention identify incomplete sentences before they are passed to the translation software. In some cases, incomplete sentences are expanded to structures that are easier for the translation software to handle. In other cases, they may simply be flagged so that they are not treated as full sentences by the translation software. In either case, the result is a more accurate translation of the closed caption data.

The vocabulary set for real-time broadcasts such as news presents yet another problem. In general, the vocabulary is broad and varied and therefore, requires ongoing additions to the machine translation software's dictionaries. The present invention addresses this problem by building specialized dictionaries according to topics. These specialized dictionaries are used in the translation process to produce higher quality translations. In addition to building dictionaries, topic changes are automatically identified during a program to determine which dictionary is appropriate for the context of the program. The building and automatic selecting of specialized dictionaries results in higher quality translations of closed caption data.

Referring to Fig. 5, the automated pre-editing process of the present invention comprises the following steps. First, in step 500, specialized dictionaries are developed according to topic. The context of a particular program may be very important in developing correct translations. The use of topic-based dictionaries for use by the machine translation software allows for more accurate translations. In the next step 502, the current program topic is identified to determine which dictionary should be used by the machine translation software. The topic may be identified by examining the frequency of the occurrence of certain key words or phrases. Other techniques may be

used to identify the appropriate topic. Once a dictionary is selected for the machine translation software, the process of translating incoming CC data may begin.

In step 504, phonetically based and other spelling errors occurring in the incoming text stream are corrected. Dictionaries that comprise phonetic spellings and associated correct spellings may be used to complete the correction of spelling errors. In the next step 506, sentence boundaries are identified and demarcated. In step 508, clause boundaries are identified and demarcated. After the sentence and clause boundaries are identified and demarcated, punctuation is added to the sentences and clauses, as appropriate in step 510. In step 512, ellipses appearing in the text stream are identified and text is inserted to complete the sentence. For unaccented text, accents are inserted where appropriate in step 514. In step 516, the speaker is identified based on CC position or voice print so the proper identifying information may be added to the output. Finally, in step 518, the pre-editing process checks for the end of the text stream to determine whether there is additional CC text to translate. If there is additional CC text to translate, the pre-editing process continues. Steps 502 to 516 are repeated for the incoming CC text.

The present invention translates closed caption data received from a live or taped television broadcast virtually in real-time so that a viewer can read the closed caption data in his or her preferred language during the broadcast. The present invention instantly localizes television program content by translating the closed caption data from a source language to a target language. The process of the present invention is fully automated, and includes a text flow management process and a pre-editing process that may be used in conjunction with any machine translation system. Various

modifications and combinations can be made to the disclosed embodiments without departing from the spirit and scope of the invention. All such modifications, combinations, and equivalents are intended to be covered and claimed.

WHAT IS CLAIMED IS:

1. A system for closed caption data translation, comprising:
 - a closed caption decoder for extracting closed caption codes from a signal comprising closed caption data;
 - a server adapted to receive said closed caption codes from said closed caption decoder and translate text in said closed caption codes; and
 - a device for receiving translated text from said server.
2. The system of claim 1 wherein said device is a closed caption encoder.
3. The system of claim 1 wherein said device is a subtitle.
4. The system of claim 1 wherein said device is a text-to-speech module.
5. The system of claim 1 wherein said signal is from a television broadcast.
6. The system of claim 1 wherein said signal is from a videotape recorder.
7. The system of claim 1 wherein said server comprises text flow management software.
8. The system of claim 1 wherein said server comprises pre-editing software.
9. A method for translating closed caption data comprising the steps of:
 - receiving program source signals;
 - decoding text from closed caption data in said program source signals;
 - translating said text from a source language to a target language;
 - inserting said target language text in program destination signals; and
 - transmitting said program destination signals to a program destination.
10. The method of claim 9 wherein the step of receiving said program source signals comprises the step of receiving said program source signals from a broadcast.

11. The method of claim 9 wherein the step of receiving said program source signals comprises the step of receiving said program source signals from a videotape recorder.
12. The method of claim 9 wherein the step of inserting said target language text in program destination signals comprises the step of inserting said target language text in program destination signals as subtitles.
13. The method of claim 9 wherein the step of inserting said target language text in program destination signals comprises the step of inserting said target language text in program destination signals as closed captions.
14. The method of claim 9 wherein the step of inserting said target language text in program destination signals comprises the step of inserting said target language text in program destination signals as a separate audio program.
15. The method of claim 9 wherein the step of pre-editing said text comprises the steps of:
 - identifying a topic to select a dictionary for translation;
 - correcting spelling errors;
 - identifying and demarcating sentence boundaries;
 - identifying and demarcating phrase boundaries;
 - identifying and demarcating personal, business and place names;
 - adding punctuation;
 - identifying ellipses and inserting text; and
 - detecting unaccented text and inserting accents.
16. The method of claim 15 further comprising the step of identifying a speaker.

17. An apparatus for closed caption translation comprising:

a server adapted to receive closed caption codes and transmit text in a target language; and

machine translation software on said server for translating text in said closed caption codes from a source language to said target language.

18. The apparatus of claim 17 further comprising pre-editing software on said server for pre-editing text in said source language.

19. The apparatus of claim 18 wherein said pre-editing software is adapted to:

identify a topic to select a dictionary for translation;

correct spelling errors;

identify and demarcate sentence boundaries;

identify and demarcate phrase boundaries;

identifying and demarcating personal, business and place names;

add punctuation;

identify ellipses and inserting text to fill said ellipses; and

detect unaccented text and inserting accents.

20. The apparatus of claim 18 wherein said text in a target language comprises translated titles.

21. The apparatus of claim 18 wherein said text in a target language comprises translated closed caption data.

22. The apparatus of claim 18 wherein said text in a target language comprises translated audio.

ABSTRACT

A system and method is disclosed for translating closed caption data from a source language to a target language during a broadcast. The system and method are fully automated to provide accurate and timely translations of closed caption data. The system and method include a text flow management process and a pre-editing process that may be used in conjunction with any machine translation system. The text flow management process facilitates the input of closed caption data in a source language from a program source to the output of closed caption data in a target language to a program destination. The pre-editing process improves the quality of translation performed by machine translation software by addressing various problems associated with real-time translation of closed caption data.

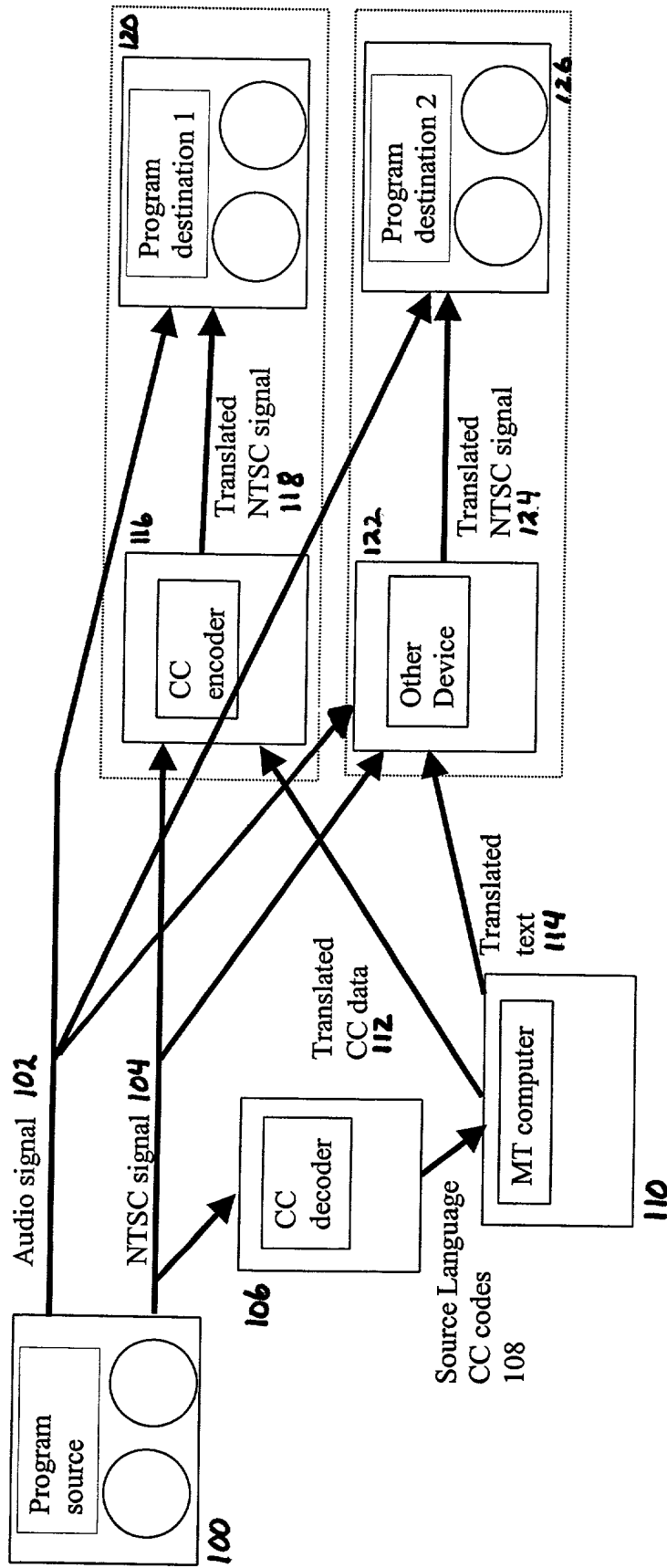


Fig. 1

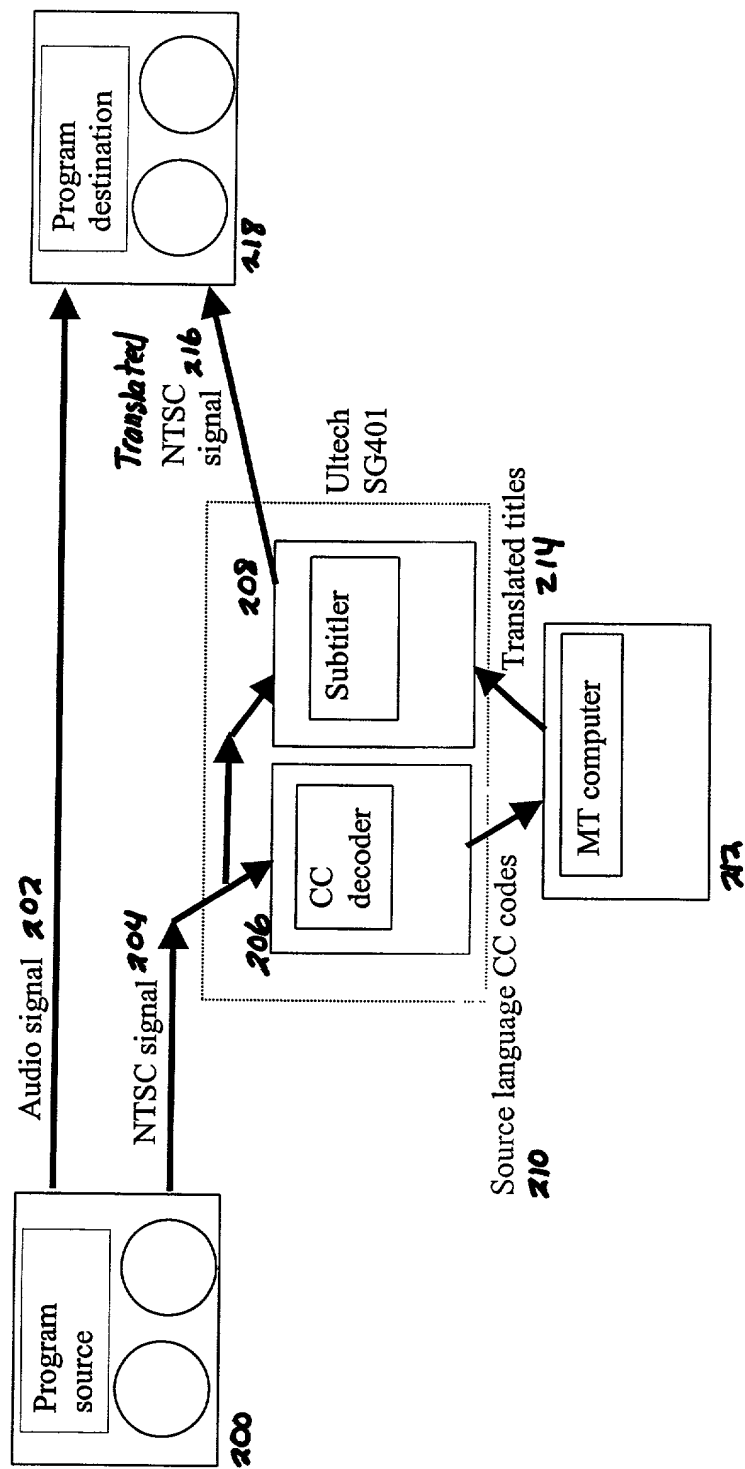


Fig. 2

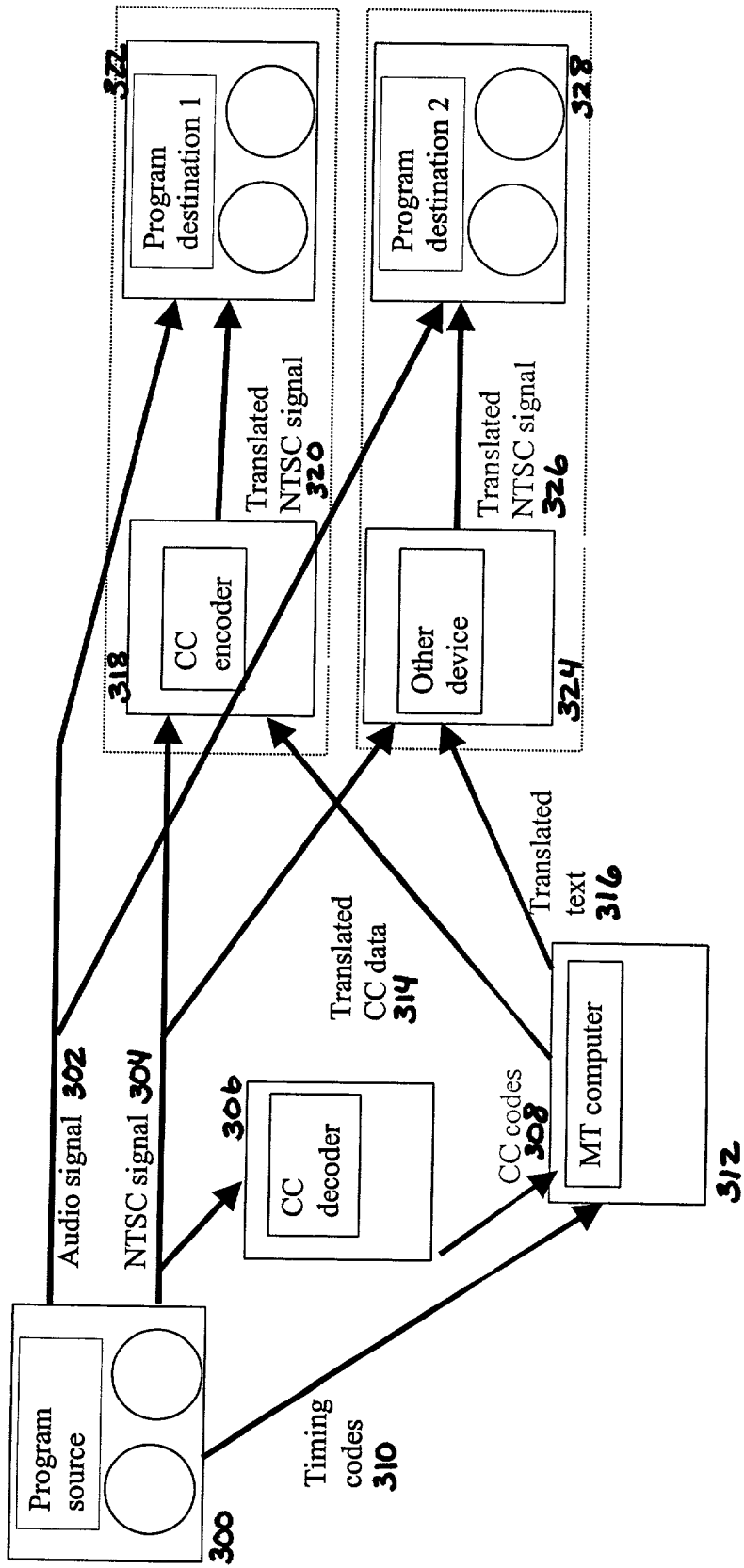


Fig. 3

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Issued Jan. 14, 1995
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Attorney: [illegible]

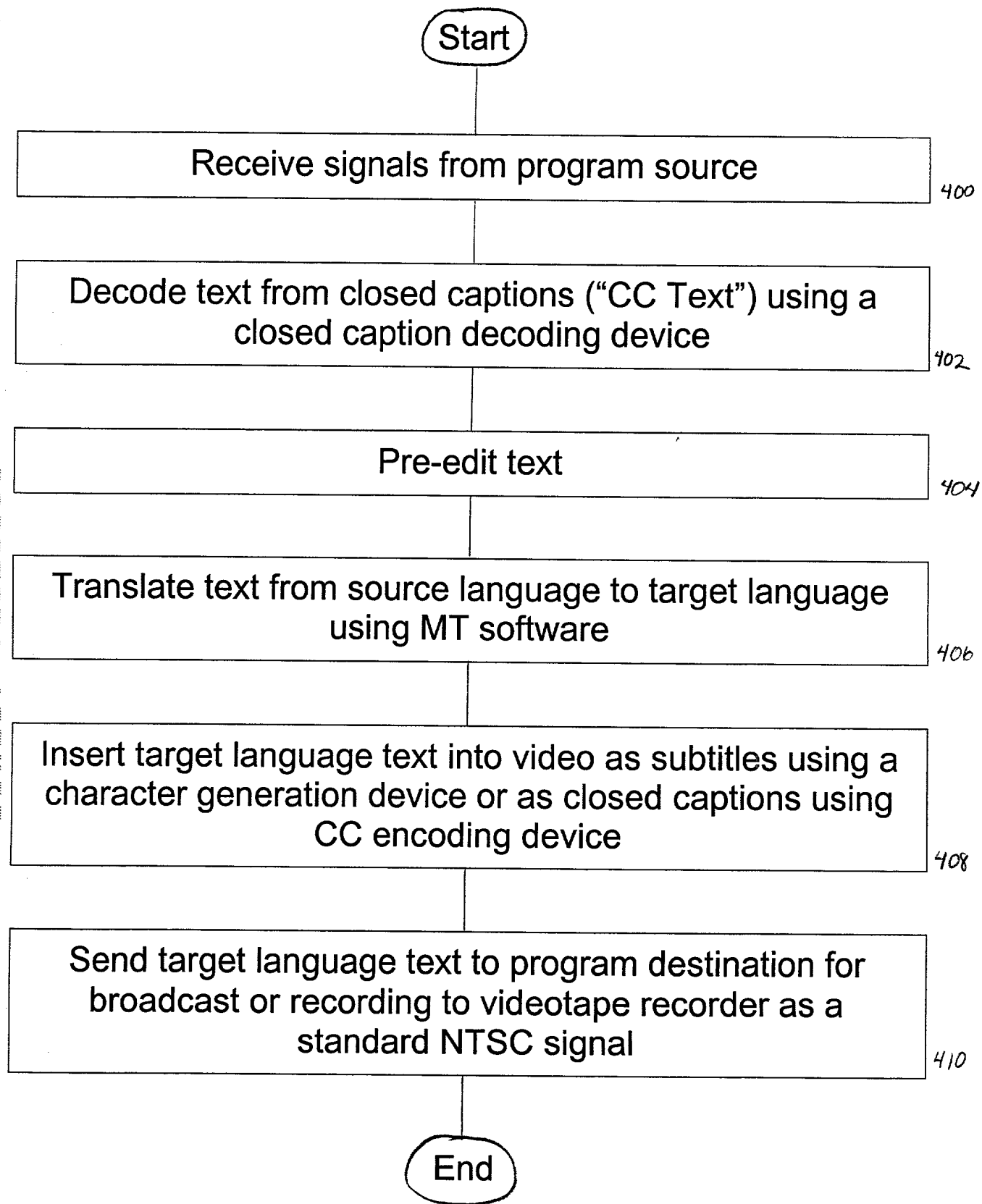


Fig. 4

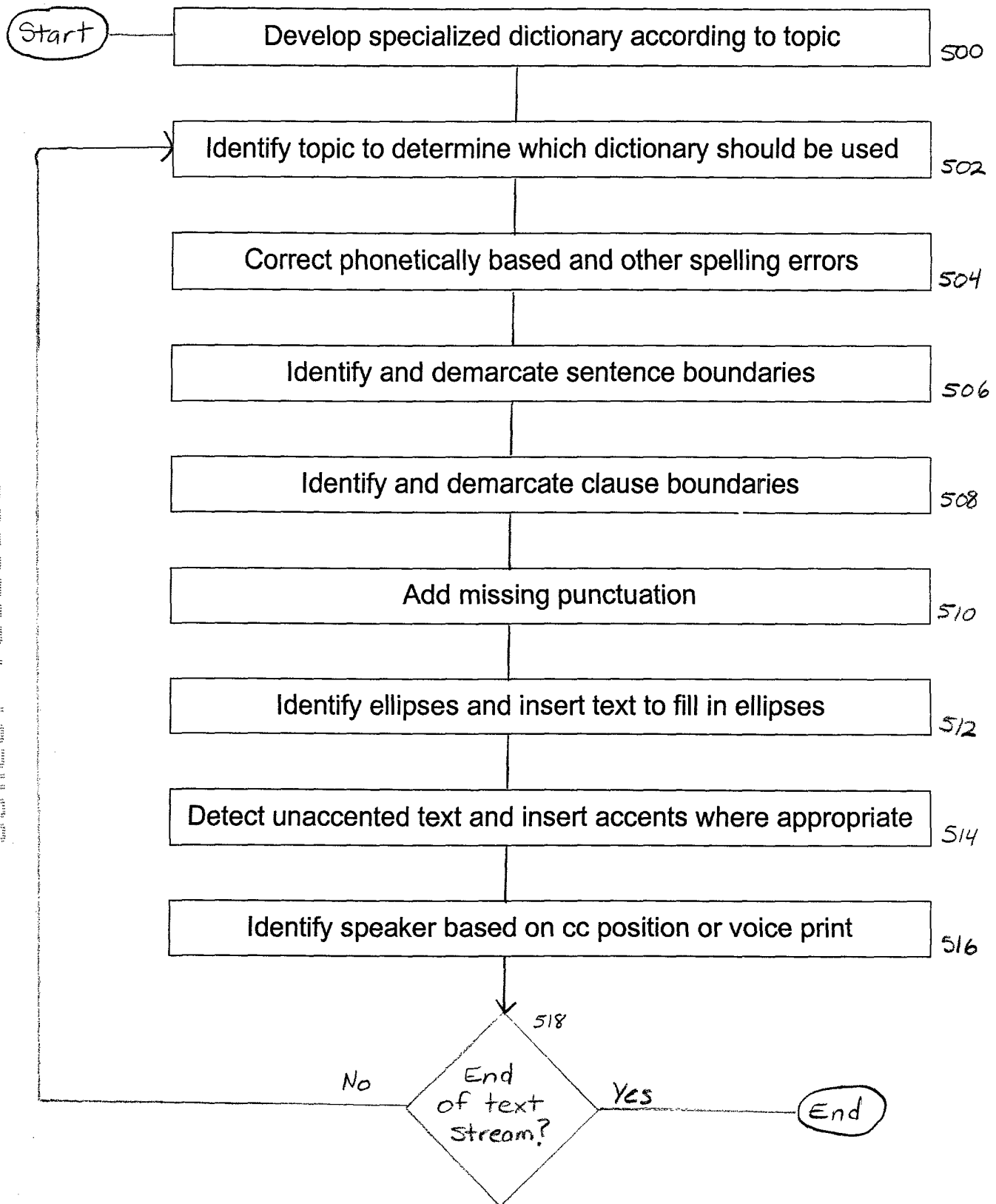


Fig. 5

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)	Attorney Docket Number	MUL1612-002
	First Named Inventor	Flanagan et al.
	<i>COMPLETE IF KNOWN</i>	
	Application Number	/
	Filing Date	October 24, 2000
	Group Art Unit	
<input checked="" type="checkbox"/> Declaration Submitted with Initial Filing	OR	<input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)
Examiner Name		

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled.

SYSTEM AND METHOD FOR CLOSED CAPTION DATA TRANSLATION

the specification of which (Title of the Invention)

☒ is attached hereto
OR
☐ was filed on (MM/DD/YYYY) as United States Application Number or PCT International Application Number and was amended on (MM/DD/YYYY) (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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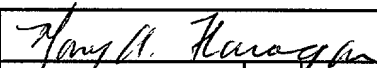
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Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
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City	Framingham	State	MA	ZIP	01701
				Country	USA

☒ Additional inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto

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<h1>DECLARATION</h1>	ADDITIONAL INVENTOR(S) Supplemental Sheet Page <u>1</u> of <u>1</u>
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Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])			Family Name or Surname		
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Inventor's Signature	<i>Philip Jensen</i>				Date 10/19/00
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Post Office Address 1182 Clark Ave 165 East Lakeview Avenue					
Post Office Address					
City	Mountain View Columbus	State CA OH	ZIP 94040 43202	Country	USA
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])			Family Name or Surname		
DOUGLAS P.			CHINNOCK		
Inventor's Signature	<i>Douglas P. Chinnock</i>				Date 10/16/00
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Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])			Family Name or Surname		
Inventor's Signature					Date
Residence: City		State	Country	Citizenship	
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